Boundaries and public land surveys of Minnesota /

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BOUNDARIES AND PUBLIC LAND SURVEYS OF MINNESOTA.*

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The history of the surveys made by the United States government in the state of Minnesota properly embraces the exterior boundaries of the state, the survey and subdivision of all the public lands within these boundaries, and the topographical survey that is now being made under the direction of the Geological and Geodetic Survey of the United States.

The last named survey, however, begun here only in a few tracts of quite limited extent, as for the map sheets comprising St. Paul and Minneapolis, Lake Minnetonka, Lake Itasca, the Interstate Park at the Dalles of the St. Croix river, etc., I leave undescribed, with only this brief mention.

BOUNDARIES OF MINNESOTA.

The boundaries of the state are thus described in the Enabling Act passed February 26th, 1857:

Beginning at the point in the center of the main channel of the Red River of the North, where the boundary line between the United States and the British possessions crosses the same; thence up the main channel of said river to that of the Bois des Sioux River; thence up the main channel of said river to Lake Traverse; thence up the center of said lake to the southern extremity thereof; thence in a direct line to the head of Big Stone lake;

thence through its center to its outlet; thence by a due south line to the north line of the State of Iowa; thence along the northern boundary of said state to the main channel of the Mississippi river; thence up the main channel of said river, and following the boundary line of the State of Wisconsin, until the same intersects with the St. Louis river; thence down the said river to and through Lake Superior, on the boundary line of Wisconsin and Michigan, until it intersects the dividing line 650 between the United States and the British possessions; thence up Pigeon river, and following said dividing line to the place of beginning.

The south boundary of Minnesota, which is the north line of Iowa, was fixed by the Enabling Act of Iowa, passed August 4th, 1846, which reads as follows:

Up the main channel of the said Big Sioux river, until it is intersected by the parallel of forty-three degrees and thirty minutes north latitude; thence east along said parallel of forty-three degrees and thirty minutes, until said parallel intersects the middle of the main channel of the Mississippi river.

On March 3rd, 1849, Congress passed the bill which authorized the survey of this boundary, and appropriated the sum of $30,000 at different times to defray the expense of the same. The survey was made by Captain Andrew Talcott of the Topographical Bureau of the United States in 1852, at a cost of $32,277.73, or about $124 per mile.

William A. Burt, the inventor of the solar compass, sent out Captain J. M. Marsh, of Dubuque, to run the line with a solar compass, ahead of the government party, to test the practicability of that instrument. His line proved to be perfectly correct. The line is about 260 miles long. Had the United States government let the contract to run this line to Captain Marsh at $25 per mile, it would have cost the government but $6,500, and would have been run and marked as well.

The east boundary of the state, which is the west line of Wisconsin, is described in the Enabling Act of Wisconsin, approved August 6th, 1846, as follows:

Through the center of Lake Superior to the mouth of the St. Louis river; thence up the main channel of said river to the first rapids of the same, above the Indian village, according to Nicollet's map; thence due south to the main branch of the River St. Croix; thence down the main channel of said river to the Mississippi; thence down the center of the main channel of that river to the northwest corner of the State of Illinois.

This is all a natural boundary along well defined water courses, except that part between the St. Louis river and the St. Croix river, a distance of about forty-one miles through Range 15 west of the Fourth Principal Meridian. The boundary is east of the west line of that range 24.60 chains at the south end, and 651 37 chains at the north end. This line was run by George R. Stuntz in 1852.

The north boundary of Minnesota is the international boundary between the United States and Canada. It was defined by the Treaty of 1783, negotiated for this boundary in 1782, as follows:

…through Lake Superior, northward of the Isles Royal and Philippeaux, to the Long Lake; thence through the middle of the said Long Lake, and the water communication between it and the Lake of the Woods, to the said Lake of the Woods; thence through the said Lake to the most northwestern point thereof; and from thence on a due western course to the River Mississippi; thence by a line to be drawn along the middle of the said river Mississippi until it shall intersect the northernmost part of the thirty-first degree of north latitude.

The Treaty of Ghent, made in 1814, provided in Article IV: “In order therefore to finally decide upon these claims it is agreed that they shall be referred to two commissioners,” etc. Article VII provided that these commissioners “are hereby authorized…to fix and

determine, according to the true intent of the said Treaty of Peace of 1783, that part of the boundary between the dominions of the two Powers which extends from the water communication between Lake Huron and Lake Superior to the most northwestern point of the Lake of the Woods,…and to cause such parts of the said boundary as require it to be surveyed and marked…and particularize the latitude and longitude of the most northwestern point of the Lake of the Woods."

In the Treaty of 1818, Article II, we find the following:

It is agreed that a line drawn from the most northwestern point of the Lake of the Woods along the forty-ninth parallel of north latitude, or, if the said point shall not be in the forty-ninth parallel of north latitude, then that a line drawn from the said point due north or south, as the case may be, until the said line shall intersect the said parallel of north latitude, and from the point of such intersection, due west, along and with the said parallel, shall be the line of demarkation between the territories of the United States and those of His Britannic Majesty, and that the said line shall form the northern boundary of the said territories of the United States, and the southern boundary of the territories of His Britannic Majesty, from the Lake of the Woods to the Stony Mountains.

In 1842 was made what is termed the Webster-Ashburton Treaty, in which we find the following:

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Adopting the line traced on the maps by the commissioners, through the River St. Mary and Lake Superior, to a point north of Isle Royale in said lake, one hundred yards to the north and east of Isle Chapeau, which last mentioned island lies near the northeastern point of Isle Royale, where the line marked by the commissioners terminates; and from the last mentioned point, southwesterly, through the middle of the sound between Isle Royale and the northwestern main land, to the mouth of Pigeon River, and up the said river, to and through the north and south Fowl Lakes, to the lakes of the height of land between

Lake Superior and the Lake of the Woods; thence along the water communications to Lake Saisaginaga, and through that lake; thence to and through Cypress Lake, Lac du Bois Blanc, Lac la Croix, Little Vermilion Lake, and Lake Namecan, and through the several smaller lakes, straits, or streams, connecting the lakes here mentioned, to that point in Lac la Pluie, or Rainy Lake, at the Chaudiere Falls, from which the commissioners traced the line to the most northwestern point of the Lake of the Woods; thence along the said line to the said most northwestern point, being in latitude 49° 23# 55# north, and longtitude 95° 14# 38# west from the observatory at Greenwich; thence, according to existing treaties, due south to its intersection with the forty-ninth parallel of north latitude, and along that parallel to the Rocky Mountains.

Thus we see that it took the United States and Great Britain sixty years, from 1782 until 1842, to locate and define the north boundary of the state of Minnesota. This boundary is marked by iron monuments, six inches square and four feet out of the ground, marked “Treaty of London, 1818.”

The west boundary of Minnesota is defined with sufficient minuteness in the Enabling Act of the state. E. H. Snow and Henry Hutton ran the lines of that boundary in 1859. There are iron monuments eight inches square and five feet out of the ground at the south end of Lake Traverse and the north and south ends of Big Stone lake, to mark these initial points in the boundary. The monuments at the south end of Lake Traverse and the north end of Big Stone lake are transposed, so that the one at Lake Traverse reads “Big Stone,” and the one at the north end of Big Stone reads “Lake Traverse.”

THE SYSTEM OF UNITED STATES LAND SURVEYS.

The present system of rectangular survey was introduced into the Continental Congress May 7th, 1784, by a committee of five appointed for that purpose, consisting of Thomas Jefferson, of 653 Virginia, chairman, Hugh Williamson, of North Carolina, David Howell, of Rhode Island, Elbridge Gerry, of Massachusetts, and Jacob Read, of South Carolina.

Though crude and unwieldy at first, it embodied the principle that has been carried out and perfected, until it is now perfect in theory, if not in practice.

It recognizes the spherical form of the earth, the fact that the meridians of longitude converge toward the pole until they come together like the spokes in the hub of a wheel. The distance between any two meridians of longitude grows less as they run north in exact proportion to the cosine of the latitude, so that it can be ascertained with mathematical accuracy just how much convergence there is in any township by first determining the latitude of the town.

Starting at the equator with two meridians six miles apart and running due north, they would converge until at this point, 45° north latitude, they would be only about four and one-fourth miles apart, measuring from east to west. At 60° north latitude they would be three miles apart, or just half as far apart as they were at the equator. At 71° north latitude they would be about two miles apart. At 80° they would be a mile and twelve rods apart, and so on to the north pole.

In the state of Minnesota, west of the Fifth Principal Meridian, to overcome this convergency and keep the townships six miles wide east and west, as near as may be, standard parallels have been run every twenty-four miles apart, separated thus by four townships, measured from the east toward the west, making the towns six miles wide east and west, and making an offset toward the west on every standard parallel.

The principal meridians with their base lines, from which surveys are built-up all over the country, are entirely arbitrary in their location. A surveyor goes out into the country which is to be surveyed, and, selecting some natural landmark which is permanent and easily identified, determines by observation the latitude and longitude of the place, and from it runs a line due north and south, measuring the distance carefully with two sets of chainmen, marking every mile and half mile with a section or quarter-section corner. From

the same point a base line is run east and west, being marked and measured in the same manner. These lines form a base for the survey of large tracts covering whole states.

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MERIDIANS AND PARALLELS IN MINNESOTA.

The greater part of the surveys in Minnesota is made from the Fifth Principal Meridian, which starts from the mouth of the Arkansas river, in longitude 90° 68# west from Greenwich, and has a base line running due west from the mouth of the St. Francis river in Arkansas. This meridian governs the surveys in Arkansas, Missouri, Iowa, the part of Minnesota west of the Mississippi river and west of the Third Guide Meridian north of this river, and in the part of South and North Dakota east of the Missouri river.

The Fourth Principal Meridian starts in latitude 38° 58# 12#, longitude 90° 29# 56#, in the middle of the channel of the Illinois river, and runs north through Wisconsin, across Lake Superior, and through that part of Minnesota north of the lake.

The south boundary of Minnesota is the north line of township 100 north of the base line of the Fifth Principal Meridian. From a point in this line three townships or eighteen miles west of the Fifth Principal Meridian, a guide meridian was run north between Ranges 3 and 4 to the Mississippi river at or near La Crescent. From a point in the state line ten townships or sixty miles west of the Fifth Principal Meridian, the First Guide Meridian was run north between Ranges 10 and 11 to the Mississippi river at the foot of Lake Pepin. From a point in the state line seventeen townships or 102 miles west of the Fifth Principal Meridian, the Second Guide was run north between Ranges 17 and 18, striking the Mississippi above Hastings. From the state line 144 miles west of the Fifth Principal Meridian, the Third Guide was run north between Ranges 24 and 25, striking the Mississippi near Monticello. This guide meridian crosses the Minnesota river at Belle Plaine, passes three miles west of Lake Minnetonka, and crosses Crow river between Delano and Greenwood.

The Third Guide is a straight line to the Mississippi river near Monticello. It does not cross the river there onto the east side, but starts again on the west side of the Mississippi river at Pine Knoll, about six miles west of Aitkin, and runs thence north to the international boundary, crossing the Mississippi at White Oak Point, about ten miles northwest of Pokegama falls.

This Third Guide meridian, in its part earliest surveyed, from the state line to Monticello, was required to be run during the winter when the lakes and rivers were frozen, so that the distances 655 could be measured on the ice and not be liable to the errors incident to triangulation. A similar precaution would have saved much bad work later on.

Elisha S. Norris had the contract to run these guides, as also the 1st, 2nd, 3rd, 4th, and 5th standard parallels between them. Mr. Norris got his solar compass out of adjustment, which threw his work out of line. This being detected by the inspector, he was called in. His assistant, Thomas Simpson, was appointed in his place, and ran these lines in 1853–5. Mr. Simpson's narration of that work was published in Volume X of this Society's Historical Collections (1905, pages 57–67).

From near Monticello, the Fifth Meridian surveys were carried north along the west side of the Mississippi river by offsets from the Third Guide past St. Cloud, Little Falls, and Crow Wing, as far as to the Ninth Standard Parallel. That parallel was run east to the east line of Range 25 west of the Fifth Principal Meridian, and there the Third Guide Meridian was located and established and run south five miles to the Mississippi river.

The Second Guide Meridian runs north from the state line twenty-four miles between Ranges 17 and 18, and then makes an offset to the east equal to the convergency in the twenty-eight townships between the Second and Third Guides and between the state line and the First Standard Parallel; thence it runs north again twenty-four miles to the Second Standard, and there offsets east equal to the convergency in that check, and so on north.

The First Guide was run north from the state line between Ranges 10 and 11, and at the First Standard was offset east equal to the convergency in two checks. Thence north it makes the offset east every twenty-four miles equal to the convergency in two checks. West of the Third Guide the offsets for convergency are made to the west.

The standard parallels between the guide meridians are first run as random lines. If they do not close on the guides at the offset made for convergency, they are corrected back so as to make them close and be twenty-four miles apart at both ends, according to the distance as measured along the guides. They are measured from the east toward the west, and a section corner is established at every mile, with intermediate quarter-section corners, and with 656 township corners every six miles. These corners are called standard corners, and belong to the townships north of the standard parallels. When the check is surveyed into townships and sections, another set of corners is established on the standard parallel on the north side of the check wherever these lines strike the standard. These corners at the north are called closing corners, and they belong to the township immediately south of the standard.

The instructions from the General Land Office now require the guide meridians to be twenty-four miles or four townships apart, so that a check contains sixteen townships. That is the rule in Canada, immediately north of us, where the convergency is greater than here and needs to be corrected oftener. But in all the surveys under the Fifth Principal Meridian in Minnesota the guide meridians are forty-two miles or seven townships apart.

Farther south, in Missouri and Arkansas, the guide meridians are as much as sixty miles or ten townships apart. There the convergency is not so great, and does not need to be corrected so often.

The Fifth Meridian surveys cover all that part of this state west of the Mississippi as far up as Pine Knoll and west of the Third Guide Meridian from Pine Knoll to the north line of the state, except the Fort Snelling Military Reservation.

The Fourth Meridian surveys cover all that part of Minnesota east of the Mississippi as far north as to White Oak Point, the part east of the Third Guide (west of the Fifth Principal Meridian) north of that point to the international boundary, and also the part lying west of the Mississippi river and east of the Third Guide between Pine Knoll and White Oak Point.

Surveys from the Fourth Meridian were first extended across the Mississippi to its west side at or near Pine Bend, and were extended west about eighteen miles and north about the same distance, far enough to include the Fort Snelling Military Reservation, which covered the present city of Minneapolis. These surveys were made for the purpose of defining and locating the boundaries of the reservation. Jesse F. Garrett had the contract for running the lines, and Captain Mahlon Black, late of Minneapolis, assisted in running them.

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TOWNSHIP SURVEYS.

Minnesota was once a part of the District of Dubuque, which consisted of the states of Iowa, Wisconsin, Minnesota, and the Dakotas, with the surveyor general's office at Dubuque, Iowa. The early surveys of townships in Minnesota were made under contracts let through that office by Warner Lewis, surveyor general. This state was made a separate district in the year 1853, and J. F. Chandler was appointed its first surveyor general. Since that time Charles L. Emerson was appointed in 1857, William D. Washburn in 1861, Levi Nutting in 1865, C. D. Davidson in 1869, Charles F. Brown in 1871, Dana E. King in 1873, General James H. Baker in 1875, Dr. J. H. Stewart in 1879, J. F. Chandler a second time in 1883, J. F. Norrish in 1887, James Compton in 1891, P. H. Kerwin in 1895, and E. S. Warner in 1901, who now holds the office and is likely to be the last.

The contract has been let for the survey of the last township in this state. When that is done and the field notes are worked up, the surveyor general's office will be closed, and the archives of the office, including all the plats and field notes of all surveys of Minnesota

lands, will be turned over to the state, which will be required to give a bond to the United States for their safe keeping in a fireproof building where they will be kept as a public record and accessible to any citizen who may have occasion to examine them. They will probably be in custody of the State Auditor, as the proper custodian of all and any papers pertaining to the survey and affecting the title of any land in the state.

The twenty-eight townships bounded on the north and south by standard parallels twenty-four miles apart, and on the east and west by guide meridians forty-two miles apart, constitute what is called a check. The checks are divided into townships, six miles square, by running lines from the township corners on the south line of the checks north twenty-four miles and making a corner, called a closing corner, wherever the line strikes the north line of the check, and measuring the distance from the corner so made to the nearest corner already made on the standard parallel. This distance should represent the convergency of the several townships thus far surveyed in the checks between this point and the principal meridian.

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From each township corner in the check a true east and west line is run, six miles more or less, to the next township corner; and if such line strikes the corner it is built up from the east by establishing a section corner every mile, and a quarter section corner at a half mile beyond each section corner, throwing the difference more or less than six miles into the west end. If this true east and west line does not strike the next township corner, then the end of the line is swung north or south to make it strike. This is called “forcing a close.” The east and west lines are not straight lines, but are ares, or chords of arcs, of circles concentric with the north pole.

Townships north and south of each other in one tier are called a range, and the ranges are counted from the principal meridian toward the east and west. The townships in each range are counted from the base line of the principal meridian toward the north and south.

The townships thus surveyed are subdivided into sections a mile square, as near as may be. The process of subdividing into sections is the same as that of dividing a check into townships, except that the north and south lines are not true meridians, but are parallel to the east lines of the township, thus throwing the convergency all into the west tier of sections.

The method of surveying land under the Fourth Principal Meridian was different from that under the Fifth Principal Meridian. Correction lines were run and measured from the Fourth Meridian to an indefinite distance, but no guide meridians were run and measured between them to determine if they were parallel. Hence they were not called standard parallels, because they were not always parallel, but were named correction lines, because on them the convergency of the meridians was corrected. The surveys from the south closed on them as on the standard parallels.

The instructions issued by the commissioner of the General Land Office to deputy United States surveyors require that “the survey of all principal meridians and base lines, standard parallels, guide meridians, and township lines, must be made with an instrument operating independently of the magnetic needle.” Burt's solar compass, or some other instrument of equal utility, must be used of necessity in such cases; and it is deemed best that such instrument 659 should be used under all circumstances. When the needle can be relied on, however, the ordinary compass may be used in subdividing townships and meandering the shores of lakes.

USE OF THE SOLAR COMPASS.

The solar compass, invented by William A. Burt of Detroit, Mich., is the most convenient and efficient instrument ever used in surveying government lands. It can only be used when the sun shines, but it can be set up, and the course can be determined with it, without reference to any back-sights or other surrounding object, and in spite of any local magnetic attraction. When kept in perfect adjustment and properly manipulated, it will do

perfect work; but if it gets a little out of adjustment, it will throw a line out of course worse than any other instrument. It consists of a common railroad compass with a full vernier. To the vernier plate is attached the latitude are, with a limb or radius of five or six inches in length, according to the size of the compass. In the center, at a right angle to this limb, is a socket an inch and a half long and three-eights in diameter, to receive the polar axis of the instrument. On this polar axis is another limb, bearing the declination arc, on which is turned off the declination of the sun.

When the latitude and declination are turned off carefully on their respective arcs, with the polar axis of the compass parallel to the axis of the earth, then the sun will shine through a lens in one end of the limb on the declination arc, forming an image between certain parallel lines on a silver plate on the other end, and the sights of the compass will range north and south. If the compass is turned the least out of a north and south course, the image on the silver plate is thrown out of the parallel lines.

The declination of the sun at Greenwich every day at noon is to be found in any Nautical Almanac, and also the change for every hour in the day. Knowing the longitude, very nearly, of the place where you are at work, you know the difference in time between Greenwich and the place where you are. Then multiply the difference of time by the hourly change, and add or subtract the product to or from the declination given in the table, according as it is increasing or decreasing. The result is the declination you are to turn off on your declination arc. The very little difference of declination in a little difference of longitude will not be perceptible, 660 but it must be calculated and turned off on the arc as near as possible.

The latitude is to be taken at noon by turning off the declination on its arc and then turning up the latitude arc until it reaches the summit, keeping the image of the sun all the while between the parallel lines on the silver plate.

The solar compass has the reputation, among a certain class of men, of being imperfect and unreliable. It has done poor work, no doubt, but that was not the fault of the compass, —rather of the man who was using it.

USE OF THE MAGNETIC COMPASS.

The section lines in the subdivision of a township are generally run with a magnetic needle compass; but the variation or declination of the needle is required, by the instructions issued by the commissioner of the General Land Office, to be tested with the north star two or three times in each township.

The instructions require the north and south lines in the subdivision of a township to bear each about one minute more to the west than the line next east of it. This is done to put the section lines parallel to the east line of the township, and to throw the convergency all into the west tier of sections. But the utterly impractical effect of this is evident when it is remembered that the daily change of variation of the magnetic needle is from 10 to 20 minutes.

Between seven and eight o'clock A. M. the north end of the needle goes farthest to the east. At that time it begins to swing to the west, and between one and two P. M. reaches its most western elongation. The average daily direction of the needle is reached between 10 A. M. and 12 M. This motion is quite slow at first, but more rapid between 9:30 and 11:30 A. M., growing slower as it approaches its western elongation. After appearing to stand still for a short time, the needle begins to return toward where it started in the early morning. It crosses a second time the average magnetic meridian about 7 to 8:30 P. M., but these evening times are very irregular. The daily difference is greater in winter than in summer, which goes to show that the movement is influenced by the sun. Hence it is called “the solar diurnal variation.”

Another magnetic variation is called the “secular variation” of the magnetic declination, which is of great importance to surveyors in retracing old lines run by the magnetic compass many years ago, especially in the eastern states, where lines of tracts of land were run by the magnetic needle and the metes and bounds have been lost. It is also of importance in the west when the variation is given on range and section lines. The change of declination since the original survey must be calculated and allowed for, in order to trace the original line, even to assist in finding the old mates and bounds.

This secular variation extends over periods of about three hundred years. In 1680, in Baltimore, the north end of the needle pointed about 6° west of the true meridian. It seemed to be stationary at that time, but later it began to move east, which variation continued until in 1802 it pointed about half a degree west. At that date it again seemed stationary, but afterward the variation turned back to the west, until now the magnetic needle there points about 5° west. What produces this secular variation is not definitely known.

Magnetic declination is explainable by the fact that the magnetic pole is not at the North Pole. Along the meridian where it is between us and the North Pole, the needle points north. This is called the line of the no variation. When the needle is east of that line, it points to the west of north; when it is west of that line, it points to the east of north.

What makes the needle point toward the north at all times? It is supposed to be on account of currents of electricity in the earth traveling from the south toward the north. When a steel needle is magnetized and suspended at its center of gravity, one end follows the current of electricity and consequently points north. The earth itself is a great magnet. A steel bar can be magnetized from the earth by suspending it in the middle so that it points north and south, and then manipulating it with a hammer. But what makes these currents of electricity in the earth on one knows, nor whether the amount of electricity in

the earth is increasing or decreasing, nor whether it can be generated or is only collected by a dynamo.

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When inspecting surveys in the east part of Murray county in the fall of 1861, I set up my compass on a range line one afternoon where I could see the mounds on the line for five or six miles, and settled the needle to get the magnetic variation. I raised the needle off the pivot several times and let it settle. It rested at the same point every time. I left the tripod standing until the next morning, when I repeated the operation. The needle settled every time with the north end forty minutes farther west than it did the day before. The only difference in the circumstances was the course of the wind. The first day it was from the southwest, the second day it was from the southeast, with a strong wind both days and a clear bright sun. The north end of the needle followed the course of the wind.

NOTES OF MINNESOTA SURVEYS.

The first land surveyed by the United States Government in this state was by James M. Marsh and Henry A. Wiltsie under contract dated May 22nd, 1847, for running the township lines between the St. Croix and Mississippi rivers from Point Douglas north. Mr. Wiltsie had the contract for the Third correction line, which runs between townships 30 and 31. It strikes the St. Croix a little above Stillwater, and the Mississippi half way between Minneapolis and Anoka. Mr. Marsh had the contract for the township lines south of the Third correction to Point Douglas, and for about the same amount north of that line.

The Fourth correction line runs between townships 40 and 41, about at latitude 45° 59# north, and strikes the Mississippi river at or near Little Falls. This was run by Thomas Conkey in 1848.

The Fifth correction lines run between townships 47 and 48 N., five or six miles south of Carlton, and five or six miles north of Aitkin, and strikes the Third Guide Meridian (west of the Fifth Principal Meridian) near Pine Knoll. It was run by O. E. Garrison in 1864.

The Sixth correction line runs between townships 53 and 54, at latitude about 47° 07# N., and about seven miles north of Two Harbors, on the north shore of Lake Superior, and runs three miles south of Grand Rapids.

The Seventh correction line is between townships 56 and 57, and runs about eight miles north of Beaver Bay on the north shore of Lake Superior, and strikes the Third Guide Meridian 663 west of the Fifth Principal Meridian at or near White Oak Point. The Sixth and Seventh Guide Meridians were run by George R. and George E. Stuntz in 1867, as a basis for the survey of pine timber land around Pokegama lake.

The Eighth correction line, between townships 60 and 61, was run by S. N. Stebbins in 1875.

The Ninth correction line is between townships 64 and 65, and was run by Mahlon Black in 1881.

The Tenth correction line is between townships 68 and 69, and was run by George F. Hamilton in 1881.

Ed D. Atwater ran the Third Guide Meridian from the Ninth Standard Parallel south five miles to the Mississippi river, immediately east of Pine Knoll and about seven miles west of the present town of Aitkin, in 1858.

Gates A. Johnson and A. L. Thornton ran the part of this Third Guide between the Ninth and Tenth Standard parallels in 1863; and George E. Stuntz ran it between the Tenth and Twelfth standard parallels in 1867. John P. Hinchilwood, in 1876, ran this guide north from the Twelfth parallel for twenty miles, when he ran into an impassable swamp and quite the

job. This part was resurveyed and run through to the north line of the state by L. A. Ogaard in 1900.

Thomas G. Merrill ran the south and southwest boundaries of the Red Lake Indian Reservation in 1872–3, and these lines were resurveyed by A. M. Darling in 1885. Warren M. Adley ran the northwest boundary of this reservation from the intersection of the international boundary with the west side of the Lake of the Woods to the head of Thief river; and Nathan Butler ran the east boundary of this reservation in 1875, under contract with Gen. James H. Baker, surveyor general.

P. A. Conger ran the lines of the Cass Lake Indian Reservation, the Chippewa Indian Reservation, and the Leech Lake Indian Reservation, under contract with Dana E. King, surveyor general, in 1873–4.

UNITED STATES DEPUTY SURVEYORS.

About three hundred different individuals and firms have done surveying in Minnesota under contracts with the United States surveyor general of lands. Many of these have had a number of 664 contracts at different times, enough to swell the whole number of contracts to double the number of men who have done work. Among them we find the names of William R. Marshall, Thomas Simpson, Fendall G. Winston, T. B. Walker, George B. Wright, Benjamin C. Baldwin, George W. Cooley, and John Goodnow.

Following is a full list of the names of individuals and firms who have acted as United States deputy surveyors of lands in the state of Minnesota, arranged alphabetically, but under each letter in chronologic order.

W. J. Anderson, George E. Adair, Alley and Lord, E. D. Atwater, Moses K. Armstrong, Charles H. Armstrong, Albert T. Armstrong, John Abercrombie, William P. Allen, Warren M. Adley, Alex. D. Anderson, Edward P. Abbot, Lyman Ames, Allen and Barnes, John Aas.

Judson W. Bishop, A. V. Balach, C. A. Bartlett, Bradley and Davis, Isaac A. Banker, Alex. S. Bradley, Adam Buck, Silas Barnard, Albion Barnard, Nathan Butler, Benjamin C. Baldwin, Joel Bailey, John O. Brunius, Mahlon Black, Brent and Barnes, Luther Bixby, Jr., Lewis Brockman, John Ball, William Burt, Bradley and Barrett, J. F. Barnes, J. T. M. Barnes, Buck and Tyler, Samuel Bundock, S. H. Baker, L. F. Brainerd, Alvin C. Bailey, Choate F. Bartlett, A. A. Bloom, John A. Brown, Oswald Brunius.

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Ashbel Ingerson, A. and W. F. Ingerson.

Johnson and Miller, R. H. L. Jewett, Jackson and Bruce, William A. Jones, Johnson and Thornton, Jewett and McPherson, B. F. Jenness, J. D. Jenkens, Jewett and Howe, Johnson and Miller, Edwin James, Jr., William A. B. Jones, Francis H. Jewett, R. P. Johnson.

Kindred and Thornton, Kindred and Hamilton, William A. Kindred, Keegan and Crampton, Bernard Keegan, Kindred and Caldwell, David G. Kellogg, Josias R. King, King and Wilmer, M. J. Karrick, Robert N. Kettleson, George A. Kline, Warren H. Knowlton, John Kerwin.

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Lewis A. Ogaard, John Ohlsson.

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John Quigley, P. M. Quist.

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Oscar Taylor, Hiram Taylor, John Taylor, Carl E. Taylor, Charles S. Thompson.

W. P. Van Cleve.

Henry A. Wiltsie, J. E. Whitcher, George Watts, Wellman and Smoot, Wright and Walker, Jacob A. Wertley, Christian Weiland, R. K. Whitley, T. B. Walker, Walker and Allen, Fendall G. Winston, 666 Henry B. Welch, Wright and Banker, the firm of Walker, Allen and Putnam, George B. Wright, Wright and Beardsley, Wilcox and Hayden, David Watson, Charles H. Ward, Wright, Beardsley and Miles, George F. Weir, W. W. Ward, J. H. Williams, Martin Watson, Platt B. Walker.

PERSONAL REMINISCENCES.

My first experience in government surveying was in 1861, when I assisted J. W. Meyers in running the township lines between the First and Second standard parallels and the

Fifth and Sixth guide meridians, in the area that is now Murray and Pipestone counties. There were then only half a dozen families in that check, living around Lake Shetek on the head of the Des Moines river. The Indians killed a part of them and drove the rest out of the country the next summer; but the Indians did not molest us on that survey, though they were around there the most of the summer. They would sit around on the hills and watch us all day, evidently anxious to see what we were doing; and we would sit up nights and watch them, just as anxious to know what they were doing or wanted to do. A small party of them passed through our surveying party one day, between the compassman and the chainman, looking neither to the right nor left. They refused to be interviewed or drawn into conversation in either the English or Sioux language. They would pull up our stakes and throw them away, if they could, but we got onto that trick and drove them into the ground solid.

I was out with the inspector that fall inspecting this same work. We camped one night on the south end of a lake in the western part of Murray county, near a party of Indians on the north end of the lake. Fearing a visit from them in the night, we hauled the wagon close up to the front of the tent and tied the horses fast to the wagon, one on each side of the pole. To make the thing doubly safe, we tied a picket rope to each horse's forefoot and the other end of the rope to the teamster lying in the tent. Within ten minutes of the time when we extinguished the light, one of the horses started and hauled the teamster out of his blankets. Springing up and looking out, he saw the horse standing off the length of the picket rope, with the halter rope untied and hanging loose. He heard the Indian running away through the brush toward the lake. The horse was tied up again, 667 with the picket rope tied to the wagon. We found him untied the next morning, but the picket rope saved him.

The next year, 1862, I hired out with George B. Wright and Isaac A. Banker, to go on a survey on Pine river north of where Brainerd now is. The night we camped opposite Clearwater, we heard that the Sioux Indians had killed Jones and Baker at Action in the west part of Meeker county. Between Sauk Rapids and Watab we met the Ojibway Indian

Agent, Walker, with his family, leaving the country. He left his wife at St. Cloud, telling her he was going out on business. As he did not return she procured a conveyance at the stage office and went to St. Anthony Falls, which was their home. Mr. Walker had not been heard from there. He was found dead opposite Monticello, with a bullet hole through his head. His saddle horse was found grazing near by, with his saddle on. He had gone onto the ferry boat, cast off the lashings, and ferried himself across the Mississippi river. The ferryman hailed him, and asked him to return, saying that he would set him over; but he refused, saying there were three hundred Indians after him and he was afraid of them. He evidently had become insane and therefore shot himself.

Just as we were going into camp one evening at the “Big Bend” of the Mississippi, five miles below Fort Ripley, we met a man who told us there were three hundred Indians at the Agency on Crow Wing river, seven miles from its mouth; that they had made most of the employees there prisoners, and expected to attack Fort Ripley that night. We thought it safer to go on to the fort, where we arrived at about 9 P. M. Settlers from the surrounding country were coming in all night.

There were but twenty-six soldiers in the fort, raw recruits from the southern part of the state, who had enlisted for the war. They had been chasing Hole-in-the-Day for a week, had shot at him across the river as he landed from a birch canoe on the opposite side, robbed his house of a very fine rifle and other keepsakes that had been given him at Washington, and were so tired that they asked us to help them do duty. No attack was made, but a false alarm about midnight turned out every one in the fort. Men, women, and children, could be seen running from one building to another in their night clothes. Had the Indians made an 668 attack, they might have killed the greater part of us, for we could not dare to shoot on account of the danger of killing our own people.

A messenger had gone up to the Agency, who effected an armistice of three days, until the commissioner of Indian affairs, William P. Dole, could arrive, who was then in the state on his way to the Red river to treat for the land in the valley north of Wild Rice river.

We remained at the fort a week, doing garrison duty all the time. We tore down some loghouses and finished the stockade, which previously had been built only a third of the way around the buildings, having been abandoned because the appropriation was exhausted. Two little cannon, which had been used on the parade ground for salutes, we mounted in the two blockhouses at opposite corners of the stockade, so that we could rake all four sides in case of an attack by the Indians. All this time we enjoyed the government rations, including the canteen. Having put this military fort on a war footing, we held a council and decided that it was not safe to go on up to Pine river with our outfit and teams. We were not afraid that the Indians would do us any bodily harm, but a lot of young bucks on the war path, without any commissary, would not respect our rights to property which they needed very much more than we did. So we returned down the river.

Five miles out we met the Indian commissioner going up to meet the Ojibways. John Hay, late Secretary of State, was with him, being then a young man, a clerk or private secretary in Washington, studying diplomacy and practicing on the Indians. As we came down the river, we found every town either fortified or deserted. A complete Indian scare possessed the whole country.

In the winter of 1872–3, I was surveying township 57, range 23. On the east line of that township the local attraction was so great that the magnetic needle was of no use. I had to use the solar compass. There were millions of dollars of the best kind of iron ore under my feet, and I did not know it. I thought it was drift that had come down from the Mesabi Range. While we were in camp in that township the last part of December, the thermometer went down to 52° below zero at Brainerd.

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The last surveying that I did for the government was in 1890, and during the winter of 1890–91. We ran the boundary lines of the diminished Red Lake Indian Reservation and some township and subdivision lines east of the upper and lower parts of Red lake. In running these town lines, I started from an old corner near the Black Duck river on the old

east boundary that I had run in 1875. I ran north to the upper lake and then east to close on the old line. Making due allowance for the convergency, I calculated just where I should strike that line. When I had gone the proper distance, I set up the compass and looked for the old line. When found and traced out, it was ascertained that the compass was standing on the line. Every time we closed on the old line, we found it just where we expected to find it, which proved that the lines were all perfectly correct, or that they were all wrong in the same direction.

On that survey I left a lumber camp between the two parts of Red Lake on the 10th day of January, 1891, and did not see anyone but my own party again until the 10th day of March. Eight of us camped that winter under a shed tent made of a wagon cover three by five yards square. We had a big log heap burning in front of the camp every night. Some of those oak logs were so large that it required three men to carry one of them. No one suffered with the cold, and no one lost a day from sickness during that winter. No one even took a cold. My partner ran the boundary from a point five miles north of Thief River Falls due east to Red Lake. He thought he would have a better outfit than I had, and so got a large wall tent,with a sheet iron stove in it. Every man in his crew took cold, and some of them had pneumonia, and I think one of them died from the effects. When he got to Red Lake Agency, his whole outfit was so damp that it had to be dried out before it was safe to pack.

In a timber country having plenty of wood for a camp fire, there is no camp so good as a shed tent with a big fire in front. The shed keeps the wind and snow off, and reflects the heat down onto the bed, which is made of fir boughs shingled over one another a foot deep until a man's weight will not bring them down to the hard ground. The fire furnishes the principal warmth to the men in camp. I have made a camp in this manner in the
670 middle of the winter, with two feet of snow on the ground, and, after changing my underclothes, wringing the sweat out of those I took off and hanging them up around the

fire to dry, I have lain down on top of the bed of fir boughs, with nothing over me, and slept soundly until morning.

I have seen several lists of goods for an outfit for a surveying party, but I do not remember one that was not loaded down with stuff that would not pay transportation. If you are on the prairie where you can haul your outfit with teams, you can take a great many things that are not absolutely necessary but are luxuries when camping out. But in timber, where everything has to be packed by men, or even by horses, it is necessary to have everything of the least weight consistent with comfort. I have seen no better list of articles constituting an outfit than I had in 1875 on the east line of the Red Lake Reservation; and for the benefit of those who may want to supply a party in a timber country, I give it here.

From the last of September, to the first of November, five weeks, with a crew of six men, equal to one man thirty weeks, I had 300 lbs. flour, 200 lbs. pork, 60 lbs. beans, seven and a half pounds of black tea, 50 lbs. cut loaf sugar, 30 lbs. dried apples, six pounds of baking powder, and salt, pepper, soap, matches, etc.

White rice is poor food for working men, but wild rice is as hearty as beans and is easily cooked. Oat meal is good wholesome food, cooked in short order, and is easily digested, good for supper.

On the survey of the east boundary of that reservation in 1875, I had as packer one Jack Bonga, of Red Lake, who was onequarter negro and three-quarters Indian. He would pack two sacks of flour of a hundred pounds each every day, rather than make two trips for the same baggage. Two hundred pounds is a regular pack for a horse in the mountains. Jack was a nephew of George Bonga, who, when he came into the country from Lake Superior packed 700 pounds for a quarter of a mile over the portage at the Dalles of the St. Louis river. He was half negro, the son of a fugitive slave, a giant in strength, over six feet high,

over 200 pounds weight, as straight as an Indian, with sinews and cords in his limbs like a horse.